

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

Irrigation Storage Reservoir

(Number and Acre-Feet)

Code 436

DEFINITION

An irrigation water storage structure made by constructing a dam.

PURPOSES

To conserve water by holding it in storage until it can be beneficially used to meet crop irrigation requirements.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies only to sites meeting all the following criteria:

1. The water supply available to the irrigated area is insufficient to meet conservation irrigation requirements during part or all of the irrigation season.
2. Water is available for storage from surface runoff streamflow, or a sub-surface source during periods of low or non-irrigation use.
3. Topographic, geologic, and soils conditions are satisfactory for constructing an economically feasible storage reservoir.

CRITERIA

Irrigation. The amount of water required to properly irrigate the crops in the area to be irrigated and the variations in water demand within the growing season must be known to

adequately evaluate storage requirements. All demand hydrographs shall be computed from the consumptive use-time relationship, increased to reflect the anticipated level of farm irrigation efficiency plus any losses to be expected in conveying the water from the point of diversion to the farm and field. If water is required for such purposes as leaching or frost control, the amount needed shall be included in the demand hydrograph.

Storage. Irrigation storage reservoirs shall be designed to have a usable capacity sufficient to satisfy irrigation requirements in the design area, unless limited by characteristics of the reservoir site or by the available watershed yield (including limitations imposed by water rights). Additional capacity shall be provided as needed for sediment storage.

The stored water releases required to meet irrigation demands shall be those increments of the water demand hydrograph that exceed the available direct flows from other sources.

Capacity. In computing the reservoir capacity required to satisfy irrigation demands, due consideration shall be given to the length of the storage period, the anticipated inflow during this period, and the seepage and evaporation losses to be expected under the proposed plan of operation.

If the storage capacity is limited by the characteristics of the site to less than that required to meet the irrigation demands of the proposed area or if the water supply available for

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storage is insufficient to meet those demands, the quantity of water that can be made available at the reservoir outlet and the acreage that can adequately be irrigated shall be computed as a means of evaluating the benefits of the proposed installation. The benefits may be evaluated on the basis of the more frequent availability of water to satisfy irrigation demands for the full design area.

Type of structures. The type of dam and appurtenant structures to be used shall be selected for each site on the basis of hydrologic studies and engineering and geologic investigations of the site conditions and the materials available for construction.

The reservoir may be created by an impounding embankment used to intercept surface runoff or by an enclosed embankment used to store pumped water.

Foundation, embankment, and spillway. Earthen dams and embankments and related appurtenant structures shall be designed to meet the criteria in the standard for Ponds (378) or in TR-60, as appropriate.

Drop spillways, chute spillways, and box spillways shall be designed according to the principles set forth in the Engineering Field Manual of Conservation Practices, the National Engineering Handbook, Section 5 – Hydraulics; Section 11 – Drop Spillways; or Section 14 – Chute Spillways, as appropriate.

Overflow protection. An overflow protection structure with a capacity equal to or greater than the inlet stream shall be provided for an enclosed embankment. This structure may be designed and installed in combination with the outlet works.

Outlet works. Outlet works shall be provided for the controlled release of irrigation water. Outlet works may consist of a gated conduit through or over the dam for gravitational flow to the irrigated area or to a pumping plant or they may consist of a pumping plant designed to lift water directly from the reservoir basin.

The capacity of the outlet works shall not be less than that required to provide the outflow rate

needed to meet peak period irrigation system demands.

CONSIDERATIONS

An irrigation storage reservoir should be part of the treatment needed to protect the soil, water, plant, animal and air resources. In addition, a conservation cropping system, conservation tillage, crop residue management or other appropriate system should be planned to control erosion above the reservoir area and protect the other resources. The management system must be planned to prevent excessive maintenance and operation problems.

Effects on water quantity and quality shall be considered. The reservoir may provide ground water recharge in a water-losing hydrologic system or when the head of the reservoir storage exceeds the regional discharge gradient. The reservoir may provide an element of flood flow reduction and/or low flow augmentation to downstream watercourses depending on its design and operation. Baseflow to downstream watercourses may be increased in volume because of reservoir seepage and extend over a longer period of time. Evaporation would occur from the reservoir.

Ground water quality changes may occur depending on the characteristics of the recharge and surface water quality. Nutrients, sediment and sediment-attached substances would be trapped in the reservoir and improve the quality of discharge water. Chemical concentrations in the reservoir may build up in the irrigation water. The reservoir may cause more leachable substances to be carried into the ground water system. Downstream water temperatures would be increase in excess of ambient inflow by reservoir releases unless a low-level spillway was part of the practice design. The reservoir would provide water for wildlife habitat and may be sufficient to support a fishery.

Special attention shall be given to maintaining and improving visual resources and habitat for wildlife where applicable. The landowner/user will be advised if wetlands will be affected and USDA/NRCS wetland policy will apply. All work planned shall be in compliance with

General Manual Title 450-GM, Part 405, Subpart A, Compliance with Federal, State, and Local Laws and Regulations. If archaeological or historical properties are encountered, the USDA/NRCS policy in General Manual Title 420-GM, Part 401 shall be followed.

PLANS AND SPECIFICATIONS

Plans and specification for constructing irrigation storage reservoirs shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purposes.

Irrigation Storage Reservoir Specifications.

Irrigation storage reservoirs within the scope of the standard for Ponds (378) shall be constructed according to the construction and materials specifications for Ponds (378). Those within the scope of the criteria in TR-60 shall be constructed according to guide specifications in the National Engineering Handbook, Section 20.

OPERATION AND MAINTENANCE

A maintenance program shall be established by the landowner/user to maintain capacity and vegetative cover. Items to consider are:

1. Do not graze protected area of embankment and reservoir or provide well managed grazing.

2. Fertilize to maintain a vigorous vegetative cover in protected area. Caution should be used with fertilization to maintain water quality.
3. Mulch, spray or chop out undesirable vegetation periodically to prevent growth of large woody-stemmed weeds, water plants such as cattails or trees (such as willows) from embankment and spillway areas. Caution should be used to use only chemicals approved for this use on the label.
4. Promptly repair eroded areas.
5. Promptly remove any burrowing rodents that may invade area of embankment.
6. Re-establish vegetative cover immediately where scour erosion has removed established seeding.
7. Keep all spillways open and remove trash that may accumulate around entrance.
8. Periodically inspect area for any new maintenance items and if any are observed take immediate action to protect from further damage or deterioration.